Road accidents in Wales

Road accidents happen almost every day and while drivers may have the power to prevent the majority of these accidents, some are still unavoidable. Road accidents remain a significant cause of personal injury in the UK, from drivers and cyclists to pedestrians and motorcyclists. In 2022 the police forces in Wales recorded a total of 4,447(revised) road collisions an increase of 2 percent (%) compared to 2021 but a decrease of 24 (%) compared to 2019.Young people especially males, motorcyclists and pedal cyclists were more likely to be casualties than young females and car users. (Road collision statistics, Welsh Government, 2023). These road accidents in 2022 resulted in 4,447(r) personal injuries wherein 95(r) people died, 921(r) people were seriously injured and 3,431 had slight injuries. Of these road accidents, 51% occurred on 30miles per hour (mph) roads, 25% on 60mph roads and 6% on a 20mph road speed limit. (Road safety Wales, 2023).

Types of road accidents that occurred in Wales.

The Llandeilo crash where two drivers died, and a young girl airlifted to hospital was a head on collision. (BBC, 2021). It usually occurs when two vehicles travelling in opposite directions collide with each other often leading to the fatal injury of the parties at the front the car. Whereas a rear-end collision road accident occurs when one vehicle collides with the back of another car. In most rear-end collision, the car behind is at fault for accelerating too fast, not paying attention to the distance of the car ahead and not keeping a safe distance from the car in front of it. The car in front may also be at fault if it had started reversing without warning like through a light or sound. A rear-end collision road accident is rarely fatal in nature.

The accident that involved four teenagers who drowned in an upturned car that skidded off the road and into a ditch on the A48 near St Mellons, Cardiff is an example of a rollover road accident (BBC, 2023). In this instance, a vehicle with a higher center of gravity such as an SUV can flip over onto its roof or side when it negotiates a corner at a high speed.

A single car accident near Castell Y Bwch in Henllys Lane, Cwmbran, which involved one vehicle (South Wales Argus, 2024). In a single car accident, the vehicle crashes into a solid object, such as a tree, utility pole, or rail, without colliding with another vehicle. Usually, it is either due to having a negligent driver or loss of control of the car.

The fatal car accident in Wales that involved two cars at the intersection of north Walter and Hay was a T-bone collision, where one vehicle crashes at a perpendicular angle into the side of another vehicle.

Causes road accidents that occurred in Wales.

It is estimated that the common causes of road traffic accidents in Wales are due to drivers failing to look properly (39%), drivers failing to judge the other person’s path or speed (20%), drivers acting recklessly or over speeding (15%), a poor turn (13%), loss of control (12%) and drink driving (13%) (Thorneycroft Solicitors, 2021).

Failing to look properly is the most common cause of road traffic accidents in England and Wales. Most drivers do not look before overtaking or before pulling out of a junction or approaching a roundabout because of either complacency, tiredness, distracted by either mobile phones, other passengers or the radio. The second biggest cause of road traffic accidents occurs when drivers fail to judge accurately the speed and the distance of another vehicle or when they fail to slow down on roads where they cannot see around bends. Reckless driving is another significant cause of road accidents in Wales, this happens when drivers are in a rush thereby swapping lanes without looking. In addition, when drivers lose control of their vehicle due to high speed during heavy rainfall or and when they take a corner too quickly accident can occur.

Vehicle defects such as defective tires, under-inflated tires, and overloaded vehicles, poorly loaded vehicles, defective lights, brakes, steering, and mirrors are some of the contributory factors for approximately 1,200 road accidents in Great Britain. Another contributory factor is inexperience where the driver is unfamiliarity with vehicle model, inexperience with driving on the left and driving while nervous, uncertain, or panicking.

Data analysis strategy on a three-year period (2000 - 2002) of the dataset (accident level data, Wales)

A data analysis strategy is a plan using data to make informed decisions and measure performance. To design the data analysis strategy on a three-year period (2000 - 2002) of the dataset (accident level data, Wales), I employed the mixed-methods data analysis design because the dataset consisted both of quantitative and qualitative data. The quantitative data analysis design and method enabled me to measure the data in the dataset while the qualitative data analysis design and method enabled me to have an in-depth understanding of how to reduce road accidents in Wales.

I ensured the dataset collected form the online source: https://statswales.gov.wales/Catalogue/Transport/Roads/Road-Accidents/Accident-Level-Data, contained relevant variables for both quantitative and qualitative analysis with the objective to reduce road accidents and the number of casualties thereby improving the safety of road users in Wales.

The datasets for each year are stored in an excel spreadsheet comma separated format (csv) containing forty-nine (49) variables for the three-year period but 2864 values in year 2020, 3288 values 2021 having and 3315 values in 2022. The variables consist of both qualitative and quantitative data. The relevant qualitative data (“road type, time, date and day of accident”) provided depth and context. They are descriptive, they answered the "why" or "how" behind the data analysis and may have been collected through study focus groups, interviews, surveys and open-ended questionnaire items. Whereas the relevant quantitative data (“speed limit, total casualties, total vehicles, fatal, serious, slight, older drivers and young drivers”) offered objective and measurable insights, to identify trends, relationships, and make predictions. The quantitative data are numerical, they answered the “what” or “how many” of the data analysis question and may have been collected through experiments, numerical observations and surveys comprising closed-ended questions. The variables in the dataset have various datatypes namely integers, date, time string and float.

To ensure data integrity, accuracy, consistency and reliability I cleaned the dataset by checking and removing duplicates, outliers, missing values, spelling errors, unnecessary columns and inconsistencies in the dataset. The variables “road” and “Accident Reference” in all the three years dataset had outliers while the variable “Road2” in all the three years dataset had missing values.

The mixed-methods data analysis design I chose made sure that the data answered the initial question unambiguously. It also created methodological intersections that provided robust, reliable results by organizing the combination of qualitative and quantitative data in a unique manner. Among the various types of mixed-method data analysis design, I employed the use of the sequential and concurrent designs. The sequential design structure comprises of both the explanatory and exploratory sequential designs, with which I developed a comprehensive understanding with contextual depth. The concurrent design structure enabled the simultaneous collection and independent analysis of my qualitative and quantitative data thereby generating complementary insights. This design produced a well-rounded investigation that widened the lens of understanding through the principle of triangulation.

The data analysis mixed method created a compelling synergy of quantitative and qualitative data analysis method. It harnessed the strengths and compensated for the inherent weaknesses of both qualitative and quantitative data analysis designs thereby ensuring the data analysis outcome are not only statistically significant but also contextually sensitive. The inherent iterative (repeating the process until perfection) nature of the mixed methods data analysis allowed me to re-assess and re-evaluate the data analysis questions and design. It guided the entire data analysis process, formulated my research questions, designed the data analysis, analyzed the findings, and interpreted the results. It ensured the analysis conducted is rigorous and in a reliable manner, providing accurate and valid results. It provided a systematic approach to gathering and analyzing the datasets, which are essential for drawing meaningful conclusions and making informed decisions. Without a well-defined data analysis method, the data analysis can become disorganized and lack direction, leading to unreliable and inconclusive outcomes.

Data representation strategy

A data representation strategy involves selecting the most effective and meaningful ways to visually present data to convey insights. Sixty five percent (65%) of humans are visual learners meaning that they learn from visual cues, 30% from audio and 5% from experience (Bradford, 2004).

I used the clustered bar chat as my choice of data representation to compare the variables in each year and across the different years. It enabled me to compare the total casualties under a particular year and in the different years at different speed limits. It showed the relationship and major changes of the total casualties with the help of two axes. The x-axis contained the different speed limits for each year, and the y-axis contained the total number of casualties. The height of the horizontal rectangular bars is equivalent to the total number of causalities while the title is “number of casualties versus speed limits”.

From my clustered bar chart drawn, I could easily visualize and advise which of the year had more causalities and which had less causalities at a particular speed limit.

With all the benefits of my clustered bar chat, it is limited to monitoring progress not forward planning and also it is not able to show all the variables in the dataset at once.

References:

Khonje, J (2023) Police recorded road collision. Available at: https://[www.gov.wales](http://www.gov.wales) (Accessed: 1 December 2023).

Delonix, K (2017) Which are the most common types of car accidents. Available at: <https://www.quantumbooks.com> (Accessed: 3 December 2023).

Thorneycroft Solicitors (2021) Road traffic accidents - the common causes in England and Wales. Available at: <https://thorneycroftsolicitors.co.uk> (Accessed: 6 December 2023).

**Serious Injury Law (2020) 5 major causes of UK road traffic accidents and how to avoid them.** Available at: <https://www.seriousinjurylaw.co.uk> (Accessed: 9 December 2023).

Yurday, E (2022) Leading causes of car accidents in Great Britain**.** Available at: <https://www.nimblefins.co.uk> (Accessed: 10 December 2023).

# Dye. T (2022) Qualitative Data Analysis. Available at: https://getthematic.com (Accessed: 15 December 2023).

Bhandari, P (2023) What Is Qualitative Research? | Methods & Examples. Available at:

<https://www.scribbr.com/methodology/qualitative-research> (Accessed: 15 December 2023).

Regoniel, P (2023) Mixed method research. Available at: <https://simplyeducate.me/2023/11/12/mixed-methods-research> (Accessed: 19 December 2023).

Datascientyst (2023) Pandas-cheat-sheet-data-cleaning. Available at: <https://datascientyst.com/data-cleaning-steps-python-example> (Accessed: 2 January 2023).

Holtz, Y (2023) Interactive charts with Plotly. Available at: <https://python-graph-gallery.com/about/> (Accessed: 10 January 2023).

# Datascientyst (2023) Exploratory Data Analysis Python and Pandas with Examples. Available at: <https://datascientyst.com/exploratory-data-analysis-pandas-examples> (Accessed: 10 January 2023).

Plotly graphing libraries (2021) Plotly express in python. Available at: <https://plotly.com/python/plotly-express> (Accessed: 15 January 2023).

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